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ABSTRACT

A discussion of the functions of human communication shows that underlying them is the cognitive process by which people have the ability to take the view of others, to internally represent reality, and to take into account knowledge and experience to choose future actions. These features of decentration and abstraction reveal the link between human communication and consciousness. Human speech also has characteristic features that make it amenable to some cognitive functions, due in part to the complementary evolution of the vocal-auditory modality and the brain-central nervous system. The spoken word achieves the level of an act that is simultaneously experienced by all participants in the communicative event, fixing attention, focusing awareness, and stimulating mental activity as the speech act occurs. Oral utterance thus encourages a sense of continuity with life, a sense of participation, because it is itself participatory. This conclusion is further supported by studies on brain lateralization, which propose that the spoken word as event and symbol situates the consciousness of the individual at the interface between states of awareness. (RL)

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# THE SPOKEN WORD AND HUMAN CONSCIOUSNESS: A Bio-physical Perspective

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The consciousness of each of us is evolution looking at itself and reflecting upon itself. (Pierre Teilhard de Chardin, The Phenomenon of Man)

Permanent unreality is more plausible and comforting than reality that is transient. (Walter J. Ong, Interfaces of the Word)

# THE SPOKEN WORD AND HUMAN CONSCIOUSNESS: A Bio-physical Perspective

As I sit here applying ink to paper, it may be said that 1) I am doing so "consciously" with 2) a "conscious" purpose, in order that I may 3) make my potential audience "conscious" of 4) some definable area of my "consciousness." What is this property I use redundantly and yet appropriately to refer to so many aspects of the process of writing a paper -- a process of human communication? Its presence in the process is seemingly ubiquitous, and appears to be implicated in each major component of the process of human communication, regardless of the nomenclature used to describe it.

There is probably little doubt that human communication and consciousness are intimately associated. The reasonable certainty of this association does little, by itself, to advance our understanding of either phenomenon; whether we conceive them as processes or as products or both, they resist precise definition or specification. Since it is, however, the intent of this paper to explore possible relationships between spoken human communication and human consciousness, the development of working definitions of the two phenomena is warranted.

Human communication. The definition of "human communication" to be employed here was adapted from the taxonomy of speech communication proposed by Dance and Larson (1972, 1976): human communication is "the process (or the product of the process) of acting on [symbolic] information" (Dance & Larson, 1972, pp. 8-9). The editorial inclusion of the term "symbolic"

serves to specify the peculiarly human aspect of the phenomenon, and includes, by implication, the acquisition and use of human language.

Human consciousness. A hypothetical definition of "human consciousness" may be derived from a variety of sources. Dictionary definitions tend to equate consciousness with awareness (cf. Random House, Webster's). Freud (1938) described consciousness as a "sensory organ" whose sense data derives from other psychic acts. Ong (1977) relates the ontogenetic development of human consciousness to the process of bringing life "under conscious reflective control" (p. 4[illegible]). The term "reflective" is to be noted as it coincides with the attribute cited by Teilhard de Chardin (1959) as the critical feature of peculiarly human consciousness, viz., reflection. It is the self-reflexive process of experiencing one's mental activity as an object of experience, i.e., thinking about one's thinking, awareness of one's awareness, etc. "Reflection" is:

> ... the power acquired by a consciousness to turn in upon itself, to take possession of itself as of an object endowed with its own particular consistence and value: no longer merely to know, but to know oneself; no longer merely to know, but to know that one knows. (p. 165)

Teilhard explains the occurrence of this phenomenon as indicative of a point of involution in the progressive organization and internal complexification of living matter. At certain thresholds of increasing complexity, living systems are said to undergo qualitative shifts in the function of activity, corresponding to a "higher" sphere of existence (e.g., from cells to tissue, from tissues to organs). Teilhard refers to the human level of existence/activity as the "noosphere" (or thinking layer) whereby representations are organized internally and where there is a further organizational progression in the species toward convergence among all internal organizations (the "coalescence of withins"; see pp. 239 ff.).

If it can be said that consciousness generally implies an awareness or sensation of activity, then that which is specifically human consciousness will be identified by the occurrence of reflection. As such, this mode of consciousness or awareness will be at once removed from direct experience (except insofar as experience of experience could be considered "direct").

At this juncture, the question might arise as to whether human consciousness is an all-or-none phenomenon, and whether, once attained, its form and function is stable and uniform. Upon introspection, this would not appear to be the case. It would appear, rather, that consciousness exists on a number of levels, only some of which exhibit the self-reflexiveness

unique to a human consciousness. For example:

1. Feeling/action (awareness)

2. Deliberate/purposeful action (aware of a desired end)

3. Awareness of deliberate acting (reflection upon an act while acting)

4. Deliberation (reflection upon action apart from overt action)

5. Awareness of deliberation (reflection upon reflection, metatheorizing, what I am doing [i.e., acting upon] right at this moment)

6. Transcendence ??? (this hypothetical level may denote moments of synthesis where thought, feeling, action, and situation are one; a transient episode of creativity, enlightenment, equilibrium)

Two additional observations are necessary here. First, it should be noted that these "levels" of consciousness are successively inclusive, i.e., the former is subsumed by the latter: although they are usually considered as psychic phenomena, awareness and reflection are the legitimate conceptual concomitants of feeling and action (based upon the notion of a fundamental continuity in form from biological processes to feeling, and to mental phenomena; cf. Langer, 1972; Teilhard de Chardin, 1959). Awareness is a response to or sensation of some stimulus, whether originating internally or externally. Reflection is action in the sense of organizing (acting upon) information, and is what Teilhard de Chardin might have called a deliberate "complexification of within."

Second, while the hypothesized Level 6 may appear in form as a recapitulation, a falling back to the form of Level 1, it is rather an evolutionary step forward -- an intuitive leap -- accompanied by a sense of understanding (of feeling/action).

## Human Communication and Consciousness

Human Communication may be described as having three functions: 1) "The linking function -- relating self to environment and to others," 2) "The mentation function -- developing higher mental processes," and 3) "The regulatory function -- regulating human behavior" (Dance & Larson, 1976). The "functions" are those processes (or, perhaps, aspects of one

process) invariably associated with the presence of human communication. The brief discussion that follows is based upon a consideration of these functional properties of human communication.

Through symbol use or conceptualization, the individual differentiates himself from his world and establishes a relationship to it. He organizes his sensations into some kind of coherent system in order that the seemingly chaotic flow of events might gain some measure of predictability and "sense." In the earlier stages of development, this organization is particularly idiosyncratic. The individual is aware only of his or her own particular experience of the world. He is, however, immersed in a world of symbols, and of symbol-using others. These symbols are, in part, employed in the organization of experience, but are also the vehicle for communication with responding others. Through interaction, and with a growing awareness of others as distinct from himself, these symbols gain a significance heretofore unrealized. They embody the thought and experience of others as well as his own. They allow the child to learn about the world through the eyes of others. Inasmuch as the individual is himself a part of his world, he also learns about himself through the eyes of others. His concept of self develops in interaction with others (cf. Mead, 1922; Sullivan, 1953).

The acquisition of language and of the significant symbol provides a vehicle for cognitive operations and for the construction of concept-systems. Items of experience are categorized according to their salient features (e.g., morphology, function). Subsequent experience is perceived and evaluated on the basis of these categorizations and the hypothesized relations among them. The elements of experience, and their interrelationships, may be described to and by the individual through the lexicon and syntax respectively. For the developing child, this sort of description of the world occurs at the explicit verbal (syntactically and semantically expanded) level; with increasing facility at internal manipulation of symbols, the necessity for overt verbalization of thought decreases (Vygotsky, 1962). External speech communication for thought (intrapersonal) gradually internalizes, losing some of the formal properties of fully expanded communicative expression, a becomes a primary substance of covert or tacit thinking as "inner speech" (Vygotsky, 1962).

The early behavior of the individual is fully dominated by his biological processes and by the influence of responding others. The verbal commands and designations later encountered have an impelling quality, i.e., the child responds more to the stimulus properties of the signal (Luria, 1973). As words begin to accrue symbolic properties for the child, he becomes able to respond to the "meaning" or reference of

the signal. As symbols gain in significance for the child, that is to say as his meaning approaches that of others (Mead's usage of the term "significance"; cf. Mead, 1922), his knowledge of the world may also approximate that of others. His feelings about the world may become similarly shared. It becomes possible for him to act on the basis of what he knows and feels about the world (increasing autonomy). Having acquired a system of beliefs, attitudes, and values through interaction with others, he becomes increasingly able to evaluate experience and act on the basis of that evaluation. Some knowledge of others' beliefs, attitudes and values, along with increasing facility at significant-symbol use, allows the individual to exert some measure of control over others' behavior as well as his own.

One pervasive process at the core of the functions of human communication begins to emerge from the discussion. The ability to take the view of another, to internally represent reality, to take into account knowledge and experience in choosing future actions, all indicate some underlying cognitive ability making them possible. It must be possible to think of things that are not perceptually present or perhaps nonexistent. We call this ability decentration (cf. Flavell, 1963, 1968). Our effective link or adaptive relationship with ourselves, with others, and with the "world out there" depends upon the ability to take these things into account all at once, in the same mental act. Thought requires the covert manipulation of representations of reality (i.e., symbols). The regulation of one's own behavior necessitates the consideration of possible outcomes. The ability to decenter, then, is at the core of all human cognitive and communicative activity.

Another underlying process that is pertinent to this discussion is most closely associated with symbol-use per se: abstraction/generalization (Werner & Kaplan, 1963). Through differentiation and categorization, it is possible to cognitively organize the continuous flow of events in one's experience into a conception of experience that is relatively stable, structured, and meaningful (cf. Hastorf, Schneider, & Polefka, 1970). This may occur in increasing levels of abstraction or generality, depending upon the scope of the events or experience embraced by the categories and relations that result. With increasing abstractness, the "experience" as felt is increasingly removed from the direct process-level of being.

It is the features of decentration and abstraction that reveal the theoretical link sought in this essay to guide inquiry into the relationship between human communication and consciousness, for it would appear that both phenomena in question are dependent upon the same general capacities. Human communication was shown to require the ability to form

internal relationships, to imagine the view of others (role-taking), to organize information at varying levels of generality, to recall the past and imagine the future while situated in the present, and so forth. Human consciousness, with the characteristic feature of reflection, similarly requires the ability to contemplate and manipulate internally represented relationships, to imagine various alternative ways of viewing or approaching an object of consciousness, and to free oneself of a present-centeredness and process-level of experience.

It is exceedingly difficult to imagine that there could be any relevant distinctions to be made between human communication and human consciousness as they are herein defined and described. The conceptual limitations that have been attributed to both phenomena correspondingly limit the ways in which we can describe their relationship. The foregoing discussions would appear to rule out, for example, non-symbolic (non-reflective) modes of consciousness (to be addressed in the concluding discussion). It is not the intent of this paper to address all aspects of either human communication or consciousness, but rather to inquire more specifically into the role of spoken symbols and the medium of sound in the rise of consciousness in humans.

In the next section of the paper, a number of features of human speech, the spoken word, and the medium of sound will be described and discussed in terms of their implications for human communication and, relatedly, for consciousness. Prior to the discussion of features and implications, a brief summary of the research that lead to the identification of features is provided.

## The Spoken Word and Human Consciousness

The research upon which the following discussion is based (Routhier, 1979) is concerned with the continuing issue of whether speech is an "overlaid function" (cf. Gray, 1936; Gray & Wise, 1934; Lenneberg, 1967; Lieberman, 1975; Negus, 1929, 1949; Sapir, 1921; Wise, 1938). An "overlaid function" is any function which employs an anatomical structure or system which was originally developed for more fundamental biological purposes. It was proposed that the controversy surrounding the issue has a potentially heuristic value for human communication since the question itself embodies issues and arguments that pertain prima facie to the domain of human communication theory: the "overlaid function" argument is concerned by definition with the functional relationship between human speech production and its biological correlates. It was felt that a consideration of the biological basis of human communication is of major importance to the development of a complete and adequate theoretical account. Insofar as

human speech may be considered to be a major (if not predominant) modality of human communication, then the question of whether speech is "overlaid" may provide a direct approach to a description and/or explanation of the organic basis of some human communication phenomena.

The primary purpose of the study was to subject the literature which addresses the "overlaid function" question to critical scrutiny in order to determine what significance this literature might have for the study of human communication. A number of inferences (conclusions) were drawn through critical analysis; these were discussed further in terms of their implications for theory. In the next few paragraphs, some of the major conclusions of that analysis are briefly summarized, followed by a discussion of implications.

Conclusions of the critical analysis. The analysis revealed a number of substantive issues concerning the relationship between the process of speech and the biological structures and processes associated with the speech process. The first of these was the question of "fortuity." Although the initial appearance of vocal-sound production was in all likelihood an "accidental" or "chance" occurrence in infrahuman species, there was a great deal of support for the conclusion that vocal-efficiency was a significant factor in the evolution of what has become the human "speech apparatus" (e.g., DuBrul, 1958; Gray, 1936; Lieberman, 1975). The product of that evolution includes several species-specific anatomical and neurophysiological features that account for the nature and quality of human speech.

It was demonstrated that many of the biological features which underlie speech are not as efficient for their vegetative functions as their counterparts among most infrahuman species (e.g., Negus, 1929). It was proposed that the mechanisms of speech may be viewed as a functionally distinct system that includes both the peripheral effector organs as a group, and the central and peripheral neural centers and pathways involved in the production of speech sounds. Relatedly, it was shown that although speech may be subject to the demands and constraints of other contiguous systems (e.g., respiration), that speech, in turn, has a reciprocal impact upon those systems. A product of this "interdependence" may be observed in many aspects of speech such as intonation patterns, stress and juncture, and some distinctive articulatory features.

A qualitative distinction was drawn between speech and the vocalizations of any animal group by virtue of its voluntary control and the characteristics of articulation, resonance, and encoding. On the basis of this and the above conclusions, the meaning of the term "overlaid function" becomes highly specific when used to denote human speech. Speech may be

considered "overlaid" only in the sense that the speech apparatus is composed, in part, of organs or systems that were originally designed for other biological functions. All other connotations associated with the term "overlaid" (or "superimposed," or "parasitic") were shown to be simplistic, misleading, or inappropriate when applied to the function of human speech.

Implications. One of the above conclusions provides a necessary typological distinction between the terms "human speech" and "vocalization." The particulars of this conceptual distinction give rise to a set of implications concerning the nature of human speech and its role in the human communication process.

Human speech, whether regarded as a process or a product, is qualitatively distinct from the processes or products of vocalization. Human speech is a voluntary, purposeful process by virtue of its mechanisms of control which originate in secondary areas of the neo-cortex. Vocalization, by contrast, is involuntary, response-contingent or mood-dependent behavior mediated largely by the limbic cortex of the old-brain (paleocortex).

Relatedly, human speech is uniquely characterized by articulation. Voluntary psychomotor control of the organs and systems comprising the speech apparatus allows the speaker to encode meaningful acoustic features in the ongoing breath-stream by manipulation of the mechanisms of phonation and by modification of sound in the supralaryngeal cavity-spaces. While human speech is thus analytic in nature (i.e., categorical, sequential), vocalization is essentially holistic (i.e., bound to the organism, synthetic).

Finally, the resonant properties attributable to the species-specific construction of the human peripheral speech anatomy makes possible a range of sounds that far exceeds the physical capacities of any other species. This aspect, coupled with the properties of voluntary control and articulation, results in a system capable of producing a potentially infinite variety of sounds, sound-contrasts, combinations, and sequences. Human speech is thus an inherently productive (i.e., generative) system, while vocalizations are limited to the involuntary expression of an emotional state.

The typological distinction between "human speech" and "vocalization" is a crucial theoretical concern for three reasons. First, the distinction calls attention to the species-specificity and uniqueness of human speech. Whether or not the species-specificity of human speech is found to be especially significant, this realization provides necessary conceptual boundaries for the conduct of comparative studies. In other words, it would be neither appropriate nor productive to place

human speech and the vocalizations of other species into the same class of phenomena.

Secondly, the distinction makes more precise a theoretical account of human communication by differentiating between two levels of communicative behavior within the human species. Human vocal communication embodies both human speech and what has heretofore been described as vocalization. The human vocal sound-producing mechanism is at once voluntary and dependent upon contiguous systems (e.g., respiration) that are themselves influenced by the limbic cortex. Therefore, the vocal sound-production of humans, although voluntary and productive, reflects the expressiveness (i.e., emotion) characteristic of all animal vocalization.

Such a determination would increase the specificity of claims regarding such phenomena as, for example, "nonverbal communication." Whereas the paralinguistic features of an individual's speaking behavior are thought to be meaningful (cf. Knapp, 1972; Leathers, 1976), it would be important to inquire, in any given instance, about the degree to which conscious control has been exerted over those features, or conversely, the degree to which they occur unconsciously or involuntarily. It would appear that the meaning or significance of vocal-nonverbal cues would depend largely upon the level of intent; their reliability as indicators of feeling or emotion might be said to vary directly with spontaneity or the absence of conscious purpose.

The typological distinction between "human speech" and "vocalization" is a crucial theoretical concern for a third reason: several features of human speech and of vocalization have been identified which relate directly to the role of human vocal sound-production as a mode of human communication. The first, and perhaps the most important of these features, is that of voluntary control.

The evolution of voluntary control over the vocal sound-producing anatomy was, in all likelihood, a necessary concomitant of the evolution of symbol-use. Voluntary control implies an ability to behave in a manner unrelated, if necessary, to the demands of the immediate situation. Vegetative activity may be temporarily altered or suspended in such a way that there is no unitary connection between the behavior and the stimulus conditions of the moment. In the case of human speech, this connection is made even more ambiguous due to the fact that the speech apparatus employs several different systems in its operation. As such, human speech appears to be well-suited for use in arbitrary signification, since the signals produced in human speech are non-iconic, i.e., they do not correspond to any particular state of the system. It was this observation that led Sapir (1933) to propose "that

language has been enabled to free itself from direct bodily expressiveness."

This freedom from direct and determinate expression is necessary if human speech is to fulfill the requirements of a symbolic language. A symbol "stands for something else" (Eisenson, Auer, & Irwin, 1963, p. 8); symbol-use necessarily involves "displacement," or the ability to shift away from the immediacy of the moment (Dance & Larson, 1976). Through voluntary control, then, the speech signal may be employed referentially. It should be emphasized, however, that a certain degree of expression is necessarily retained in the speech signal, due to the involvement of the limbic cortex with the organs and systems upon which speech is built. An emotional state (e.g., excitement, anxiety, pleasure) may be reflected in ongoing speech as variations, for example, in pitch, color, or pace, resulting from the influence of emotion upon the metabolism and upon motor control of the musculature. The speech signal is thus both arbitrary and expressive.

The second feature of human speech described above that relates directly to the role of human speech as a mode of human communication is that of articulation. Through various maneuvers and posturings within the speech apparatus, distinctive acoustic features may be systematically encoded, at specific points in time and in a specific order, in the continuous speech signal. This aspect of human speech, also a product of voluntary control, accounts for the properties of linearity (i.e., occurring over a determinate time-span), sequentiality (i.e., dependent upon order), and categoricalness (i.e., having discrete classes of abstracted features). These analytic properties of human speech appear to be isomorpic with the analyticity of human language, and are an additional indication of the suitability of human speech as a vehicle for language. The significance of the linearity, sequentiality, and categoricalness of human speech may be even more far-reaching than that which has been suggested.

When coupled with the realization that acoustic signals are transitory or ephemeral in nature, the analytic properties of human speech may be seen to require adequate short-term memory. Langer (1972) notes:

> The elements of a visual impression are simultaneous in what William James called a "specious present" -- that is, they are psychically co-present, because the perceptual subacts overlap in their cerebral completions if not their retinal inceptions. In the case of auditory percepts, however, this integration is less assured. The tempo of sound reception and impression is much slower than that of light; speech sounds pass away as fast as new ones occur. So, as soon as

> articulate patterns of sound are to have symbolic value, they have to be held conceptually as units in a greatly extended "specious present"; and this extension is not in space, but in time. (p. 333)

An interesting, but perhaps unproductive, question might be to what degree, if at all, did the use of the medium of sound interact with the phylogenetic development of memory or of the more general cognitive capacity for displacement. A more reasonable, practical, and relevant question would address the issue in an ontological context: it appears reasonable to propose that reliance upon the vocal-auditory modality would exercise and enhance the intellectual capacities for memory and displacement in the developing individual, or the converse, that the development of memory and displacement would enhance communicative ability via the vocal-auditory modality. In addition to the proposed cognitive advantage, Thompson (1977) has noted a communicative advantage: "The fact that the communicants must remember the course of the proceedings . . . is another reason for the involving nature of speech communication" (p. 6). In other words, spoken language is engaging, and requires by its very nature an active and simultaneous involvement of the participants of a communicative exchange.

As described above, the interaction of voluntary control and articulation with the particular resonant capacity of the human speech apparatus has provided an inherently productive mechanism. Such a system has obvious advantages for the demands of a creative language since it is capable of generating an ostensibly limitless variety of distinctive signals. In order to assess the theoretical significance of this feature it would, of course, be necessary to determine the relative productivity of other available modalities. In fact, it would be equally necessary to apply such an assessment to all of the features that have been discussed in this section. Suffice it to say at this point that the process herein identified as "human speech" is characterized by a number of features that make speech highly suited to the role of a primary modality of human communication.

It was concluded above that the "speech apparatus" is a functionally distinct system which interacts and is interdependent with other contiguous biological systems (as is true with all functional systems of the total organism). The effect of this determination is to place human speech into a proper perspective: it is a natural and inevitable part of the normally functioning human organism in its normal social milieu, and not simply an addition to or usurpation of the processes of other systems. It is the interaction and interdependence between the speech system and other systems that account not only for articulation, but also for the "prosodic" features of human language. In addition to the expressive

(i.e., mood-dependent, emotional) function of the prosodic features, the appearance of voluntary control has also given to the paralinguistic aspect of speech a referential function. The purposive use of such features as stress, juncture, and pitch signal significant syntactic and/or semantic differences. So essential has this level of meaning in language become that a system of punctuation had to be devised along with the development of orthography. This development reflects the close link between modern human language and the spoken mode of expression.

Finally, the possibility that the ability to speak might serve to enhance linguistic and/or cognitive processes was explored. In the following paragraphs, a number of ways in which human speech might perform such a function are examined. These suggestions should be regarded as highly tentative, although worthy of some consideration.

Lieberman (1972) has pointed out that "the rate at which homo sapiens transmits information by speech is almost ten times faster than the rate that can be achieved through any other single sensory channel" (pp. 1-2). In addition to the obvious advantage of rapid and efficient communication, the speed of information-transmission via the vocal-auditory mode may also be indicative of certain cognitive implications. Rapid transmission of information by speech would appear to be logically related to rapid auditory reception and decoding, all of which implies a high degree of neural specialization for the processing of speech signals in particular. If this is so, it may be possible to propose that the cognitive manipulation of concepts is facilitated by the processing of auditory symbols (or rather, covert acoustic equivalents of auditory symbols). Following this line of reasoning, it could be proposed further that rapid transmission and processing of acoustic equivalents enhances the capacity for instantaneous transposition between and among concepts; this ability, if it could be shown, could provide a partial explanation for what is experienced as "juxtaposition" of ideas.

The spoken-auditory mode may be implicated in the process of memory in a pivotal way. Sperling (1963) presents evidence for a model of short-term visual memory tasks whereby rehearsal occurs in the auditory mode:

> The third component of the model deals with the subvocal and/or vocal rehearsal of the selected items and the memory for this rehearsal. The memory is called auditory information storage. It will be suggested that the auditory component may be the limiting factor in a wide range of both visual and auditory reproduction tasks. (p. 20)

Rehearsal is necessary for the retention of information beyond

the "decay time" for visual and auditory impressions. Decay time is considerably more brief, according to Sperling, for visual than for auditory stimuli. In addition, it is difficult to form a visual rehearsal feedback loop following only a brief exposure. Perhaps this is because the visual mode does not include a mechanism which is capable of reproducing visual stimuli in the way that is possible in the auditory mode through speech.

## Concluding Discussion

Human language is acquired and used primarily through speech/audition and the medium of sound. The foregoing discussion of the evolution and nature of speech suggests a few of the ways in which this mode of human communication is ideally suited for its role as a primary modality. It was shown that in addition to its social/communicative function, human speech also has characteristic features that make it amenable to some cognitive functions. This is perhaps due to what was a complementary evolution of the vocal-auditory modality on the one hand and the brain and central nervous system on the other, an idea which has considerable support (cf. Fenn, 1968; Hill, 1972; Lieberman, 1968, 1973, 1975). The notion that speech may be intimately bound to cognitive processes in ontogeny is given additional support through electromyographic data of sub-vocal glottal activity during silent thinking (cf. Sokolov, 1972).

Why speech and the medium of sound? It was demonstrated above that human speech is an inherently productive system, capable of generating an ostensibly limitless variety and number of sounds, sound contrasts, combinations, and sequences. Speech signals possess the dual properties of expression and signification. Its analytic nature is isomorphic with the analyticity of the language it serves. Its ephemeral quality places demands on the ability of individuals to hold information "in mind" until the message is complete, thus requiring adequate short-term memory. Information may be encoded and transmitted in the speech signal faster and more efficiently than in any other single modality.

The spoken word raises the contents of mind to the level of an act that is simultaneously experienced by all participants in the communicative event; it fixes attention, focuses awareness, upon mental activity as it is going on. The spoken word thus has a dual aspect: it is both a symbol and a concrete event:

> No real word can be present all at once as the letters in a written "word" are. The real word, the spoken word, is always an event, whatever its codified

> associations with concepts, thought of as immobile objectifications. In this sense, the spoken word is an action, an ongoing part of ongoing existence.
>
> Oral utterance thus encourages a sense of continuity with life, a sense of participation, because it is itself participatory. (Ong, 1977, p. 21)

The ubiquitous and omnidirectional nature of sound-as-experienced (be it actual sounds or the acoustic equivalents "heard" in covert thought) contributes to the participatory nature of speech in that speech is similarly experienced in both hearer and speaker (hearing himself). Thus the subvocal experience of speech during cognitive operations may have the effect of objectifying the subjective flow of mental acts. Among the various modalities, speech/sound would appear to be the most available to the self for those cognitive functions requiring the manipulation of verbal sysbols. It is simply there, requiring no special effort or overt action.

In an earlier section it was noted that with the inclusion of "reflection" as a critical attribute of human consciousness, non-symbolic (non-reflective) modes of consciousness would be ruled out by definition. This condition deserves some comment. Studies in bimodal consciousness (e.g., Deikman, 1971; Ornstein, 1973) and split-brain phenomena (e.g., Bogen, 1973; Gazzaniga, 1967; Sperry, 1961, 1964, 1966) have indicated that the two hemispheres of the human brain process information in fundamentally different and distinct ways. The distinctions noted are concerned not so much with the kind of information as they are with the particular way in which that information is received, and with the aptitudes and types of experience associated with the two modes.

The left brain is dominant for formal logical operations, analytic thought and the comprehension and production of language. Information processing is thought to be essentially analytic (i.e., linear, sequential, categorical, hierarchical), hypothetical (i.e., propositional), and abstract (i.e., generalized from "direct" experience or process). This mode of experience is oriented in time and is seen to require the ability for active decentering and displacement in time/space.

The right brain, by contrast, is specialized for non-discursive, perceptual thought, or what Bogen (1973) describes as "appositional" thought. Information processing, rather than being analytic as in the left, is thought to be essentially synthetic (i.e., relational, holistic, continuous) and concrete (i.e., tied to "direct" experience, immediate). This mode of experience is relative in the sense that the boundary between time and space is obscured (time is space?).

Left-brain consciousness, then, is what could be called reflective, while right-brain consciousness would be more properly called intuitive, associated most directly with sensory experience of a process nature. Deikman (1971) has made a similar distinction between the "active" and "receptive" modes. This apparent duality may be attributed in part to the structural asymmetry and functional lateralization of the neo-cortex noted by, among others, Geschwind and Levitsky (1968) and Kimura (1973) respectively. This explanation must remain only partial since the brain as a whole is labile enough to allow for a lateral shift of function in early life as a response to injury, disease, or congenital defect (cf. Lenneberg, 1967).

In concluding this essay, a look at the possibility of a synthesis or unity between the various "modes" of consciousness might be contemplated. In an earlier section, several possible levels of consciousness were described which differed in the presence, degree and nature of reflection. The fully integrated, normally functioning brain would probably experience these levels as momentary conditions in a continuous flow of awareness. In the integrated brain, the contents of one hemisphere are immediately available to the other for further processing. The notion of a synthesis might, then, include the development of a greater balance between the two seemingly antithetical modes, to a point where movement among the various levels of consciousness can occur with great facility. At such a point, the individual would not only be most capable of partitioning the ongoing process of being and of his universe in order to isolate and understand their salient features and operational principles, but he would also be able to think habitually in terms of dynamic systems of interconnectedness and reciprocal influence. The spoken word as event and symbol situates the consciousness of the individual at the interface between these states of awareness.

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